Book Reviews

Smith's Sea Fishes

Edited by M. M. Smith and P. C. Heemstra
MacMillan, South Africa, Pty, Ltd.
1047 pp. 144 colour plates

This is a monumental work that took nine years to complete. The editors, Margaret Smith and Phil Heemstra, were assisted by a total of 72 authors from 15 countries in a major co-operative effort. The results more than justify the expense, the time and the number of persons involved, the overall presentation of the book being excellent. We now have a complete and accurate record of the entire ichthyofauna of the southern African coastline.

This impressive volume describes 2150 species of fishes and includes 1500 colour illustrations and more than 1000 line drawings. Of the marine fish families of the world, 83% are covered and more than 50 new species are described. Arriving 25 years after the publication of the last edition of 'Sea Fishes of Southern Africa', it has been well worth the wait. Nearly twice as many species are described as appeared in the previous edition and many other useful pieces of information have been added. The inclusion of Afrikaans vernacular names will be welcomed by many readers.

The book is introduced by a section on the anatomy of fishes and notes on their biology, including senses, angling ethics, reproduction, growth, age determination, shape, size, swimming speed, colour, biolumescence and various other aspects of fish biology. There are also some notes on the oceanography of the Southern African region, the use of common names and the effects of fishing on fish stocks. The illustrations, like the text, are accurate and numerous photographs are included. In contrast to the previous edition, all colour plates are grouped towards the back of the book, as is a fin formula key, a glossary, an extensive bibliography, an index of scientific names and indices of English and Afrikaans common names. A conversion table allows the reader to cross-reference the scientific numbers assigned to species in the old edition and this new volume.

Incorporated in the book are not only descriptions of a large number of species, but many new finds and advances in taxonomy. Keys are provided to all genera and species. Numerous species names have changed and there are several major revisions. The kingfish (Carangidae) and lantern fish (Myctophidae) families have been totally revised, the latter jumping from 17 to 125 species. Amongst the cartilaginous fishes, for example, 173 species are described, including 103 sharks, 63 rays and 11 chimaeras. Welcome contributions are revisions of the dogfish family, Squalidae, the shark family, Carcharhinidae and the skate family, Rajidae. These and many other updates will result in the resolution of much confusion that has existed until now amongst anglers and also amongst the scientific fraternity.

In conclusion, this is an exceptional book which will be indispensable to all serious sea anglers and marine scientists in Southern Africa as well as to ichthyologists world wide. The editors and contributors are to be congratulated on a magnificent piece of work and a worthy successor to J. L. B. Smith's original 'Sea Fishes of Southern Africa'.

GIDEON ROSSOUW and ANTON McLACHLAN
Department of Zoology, University of Port Elizabeth, Port Elizabeth

Agricultural Zoology Reviews Volume 1

Gordon E. Russell (Ed.)
Intercept Ltd Ponteland, Newcastle upon Tyne, 1986
401 pp.

This is the first volume in a new series, which will contain reviews by experts on various specific subjects in agricultural zoology. The stated aim of the series is to provide reviews to enable workers in this broad and rather fragmented field to keep abreast of aspects outside their own specializations. This first volume admirably achieves its aim.

Each review traces progress in a topic, giving the background and latest developments. The reference lists are extensive and pertinent. In this first volume there are ten reviews involving organisms ranging from nematode parasites of sheep, and deciduous fruit pests to the medfly and the boll weavil.

The chapter on the genetics of the medfly, *Ceratitis capitata*, is by S.H. Saul of the University of Hawaii. The medfly is a well known major pest in terms of its wide distribution, the range of fruits that it attacks and the devastating damage it can cause if unchecked. Saul reviews current knowledge of the genetics of the fly and the way in which this knowledge is applied in seeking for more effective genetic methods of control.

There is a chapter devoted to the biology, pest status and control of leaf-cutting ants, by J.M. Cherrett of the University College of North Wales, Bangor. The New World fungus-growing ants of the tribe Attini have amongst their number species in the genera *Acromyrmex* and *Atta* that are serious pests because they cut leaves from living plants for their fungus gardens. By repeated defoliations of citrus trees, for example, they are capable of killing the majority of trees in an orchard if not controlled. Further information on their pest status is followed by an account of their biology. In the last part

of the chapter, the various attempted and current methods of control are reviewed and evaluated.

The other reviews concern the genetics of the flour moth, *Ephestia kuhniella*; the control of the boll weavil on cotton; temperate zone deciduous fruit pest control with the aid of behavioural ecology; the biology, sampling and population dynamics of the sweet potato whitefly; the effects of toxicants on insect cells; slugs as crop pests; the biochemical taxonomy of plant-parasitic nematodes and resistance in nematode parasites of sheep.

The reviews are clear and concise, and contain useful information and ideas of relevance outside the immediate topic of the review. This looks like the beginning of a very worthwhile new series for anyone working in agricultural zoology or with an interest in the field.

P. E. HULLEY
Department of Zoology & Entomology, Rhodes University, Grahamstown

A Functional Biology of Marine Gastropods

Roger N. Hughes
Croom Helm, London and Sydney, 1986
245 pp.
Price: £25.00 (hardback)

This book is one of the most recent of a series dealing with the functional biology of animals. In dealing with the functional biology of the gastropods the author has structured the book around the energy maximization premise that organisms function and behave in ways that maximize the ratio of energetic cost to gain. There are seven chapters in the book, five of which represent components of the energy budget. Each chapter is in turn subdivided into smaller sections with subheadings.

Chapter 1, entitled 'Design' deals with the classification and anatomy of gastropods. These topics are deliberately not covered in any depth as the author intends that the chapter should serve merely as an introduction to the gastropods. Chapters 2 to 6 are those based on the energy budget and therefore deal with acquisition of food; digestion and absorption; respiration; excretion and secretion; growth and finally, reproduction. The final chapter (Chapter 7) examines biological interactions, ecology and zoogeography.

The better chapters are perhaps those that deal with feeding (Chapter 2) and reproduction (Chapter 6), subjects that reflect the author's research interests. In Chapter 2, Roger Hughes examines feeding methods used by grazers, suspension feeders, deposit feeders and carnivores. The chapter goes on to deal with feeding behaviour and how various factors influence ingestion.

Chapter 3 compares the degrees by which food is predigested by gastropods and how efficient the animals are at absorbing food. Chapter 4 examines in detail factors which affect metabolic rate. This chapter goes on to deal with nitrogen excretion, mucus secretion and shell secretion but these topics receive less attention. The fifth chapter covers forms, rates and efficiency of shell growth. The topic of reproduction, in Chapter 6, involves a look at reproductive effort, male and female investment, larval development, hormonal control of reproduction and concludes with a comparison of different life history strategies. The final chapter on biological interactions, ecology and zoogeography is perhaps a little weak. This I feel is a result of the subject area being too large to condense. Nevertheless the subject of competition (intra- and inter-) receives fair treatment.

The chapters in the book vary in length, with that on growth (Chapter 5) being only 17 pages long, whereas the chapter on reproduction is 42 pages in length. I found the book easy and stimulating to read which is a result of the subject matter being logically arranged. The diagrams used are clear and each figure has a comprehensive legend. A few errors have crept into the text and references. For example, on page 18 the author implies that all pulmonates just use a lung for respiration. Marine pulmonates of the genus *Siphonaria* (Order Basommatophora) do possess secondary gills. On page 36 the text would lead the reader to believe that the accessory boring organ of the Naticacea is located in the foot, while it is not, furthermore Figure 2.8B does not illustrate this organ. The initials of Griffiths (1981) as given in the reference list are incorrect, they should be R.J. and not C.L.

As a small textbook it is a good review of much of the current work on marine gastropods. It will be valuable to both under-graduates, post-graduates and research workers in this country as it includes many references to work on South African gastropods. The book is a worthwhile investment and should act as a stimulus for future work on marine gastropods.

ALAN N. HODGSON
Department of Zoology and Entomology, Rhodes University, Grahamstown

Invertebrate Biology: A functional Approach

P. Calow
Croom Helm, London
183 pp.
Price: £6.95 (paperback)

This is the first of a series of books to deal with the functional biology of invertebrates. Although the book was published six years ago, in 1981, it was felt that it should be brought to the attention of zoologists in southern Africa. As the first in a series, the book lays down the

format of those to follow.

The book is divided into seven chapters, each having several subsections. The first chapter introduces the book, explains the rationale of text and what the author regards 'functional biology' to be. In addition the invertebrates are briefly introduced and a number of terms defined.

The next five chapters are arranged as the energy budget equation, thus they deal with the acquisition of food, respiration, excretion, growth and reproduction. Some chapters are more comprehensive than others.

In the chapter on acquisition (Chapter 2) Dr Calow looks at the types of food eaten, the strategies that animals can adopt to minimize energy expended in obtaining the maximum amount of food, and the choices that may have to be made in terms of 'how much to eat'. The final sections of this chapter deal with the gut form and function (superficially), absorption efficiency, movement of food through the gut and the normal control of feeding.

Chapter 3 explores many of the principles of respiration including synthesis of ATP, oxygen availability in air and water, uptake of oxygen and the effects of variables (e.g. body size, feeding, temperature etc.) on metabolic rate. The following chapter (4) on excretion is one of the shorter (and weaker) chapters. Excretion is first defined, the reasons why products need to be excreted explained, as well as what the excretory products are. After a brief examination of the structure of invertebrate excretory organs the energy costs and benefits of purinotelism, ureotelism and ammoniotelism are compared. A seven line paragraph (!) summarizes energy loss by secretions. The section of the book (Chapter 5) dealing with growth is one of the more comprehensive chapters. The majority of the chapter is devoted to the mechanistic basis of growth and its adaptive significance. The chapter on reproduction is also a good one. After introductory sections on gamete production fertilization, and embryonic development, the author explores planktotrophy *versus* lecithotrophy, and Iteroparity *versus* Semelparity. The final part of the chapter examines 'reproduction without sex'.

The seventh and final chapter, as the author phrases it, 'consider(s) how the separate pieces of the metabolic jig-saw fit together'. The author integrates the principles covered using *Mytilus edulis* (common european mussel) as an example. I felt that the chapter was too short and deserved more comprehensive treatment.

In summary I found the book well planned and easy to read. On the whole the examples chosen to illustrate principles are good, the graphs used are clear and come with comprehensive legends. On the negative side, diagrams are often too small with the result that details are lost. In addition, I would question the accuracy of a couple of diagrams e.g. Figure 6.1, p.129. Although I doubt whether this book will have a place as an undergraduate text in South African universities, I feel that it is one which should be brought to the attention of honours students. Such students will have the necessary background in invertebrate morphology and physiology to appreciate the book's concepts more fully.

A.N. HODGSON
Department of Zoology & Entomology, Rhodes University, Grahamstown

Leech Biology and Behaviour

R.T. Sawyer
Oxford Science Publications

Volume I: Anatomy, physiology and behaviour, pp. 1–418.
Price: R221,65

Volume II: Feeding biology, ecology and systematics, pp. 419–793.
Price: R199,65

Volume III: Bibliography, pp. 794–1065.
Price: R131,55

As its title indicates, this three-volume work covers the entire field of leech biology. Volume I deals with the anatomy, physiology and, rather oddly, the behaviour of leeches as well. The first two aspects are covered in considerable detail system by system, rather in the mould of L.H. Hyman's series on invertebrates and P-P. Grasse's Traité de Zoologie. Since Hyman did not live to write an account of the Annelida, this Volume I by Sawyer fills the gap as far as the Hirudinea are concerned.

Volume II 'Feeding biology, ecology and systematics' is, to my mind, excellent, as it draws together a wealth of information into a state-of-the-art synthesis. Throughout this volume, and to some extent in Chapter 10 of the preceding volume, (behaviour, including foraging behaviour and host recognition) there runs an undercurrent of the author's obvious interest in the medical/pharmacological aspects of leech biology. This is an area in which this reviewer too has an interest and I found Chapters 11–13 which cover feeding biology, particularly useful. A brief résumé of the medical and veterinary importance of leeches would not have been out of place here. There are numerous examples of human infestation and indeed mortalities owing to leeches in the literature — however one cannot have everything.

The accounts of the ecology of freshwater, marine and terrestrial leeches (Chapters 14, 15 and 16 respectively) are valuable and discuss many aspects of the subject, some in detail and others briefly. I winced at the use of the word 'vectorology' to head one such section. Chapter 14 dwells at some length on the feeding 'ecology', notably of malacophagous leeches, presenting a good synopsis of this topic. The author uses these opportunities to expose gaps or inadequacies in the often dated and pedestrian literature. The rôle of predaceous leeches in aquatic ecosystems has, for instance, never been clearly defined.

In Chapter 17 'Systematics and evolution', the author has introduced major nomenclatural changes without giving explanations for doing so. Limnologists in Southern Africa will thus be perplexed to find that the scourge of so many of our freshwaters and known to us as *Limnatis fenestrata*, is now *Asiaticobdella fenestrata*. The section on the evolution of the Hirudinea, which possibly date back to the upper Jurassic (approximately 150 Myr) as parasites of fish, is understandably brief and unfortunately disjunct from that on phylogeny which appears at the beginning of Volume I. Very useful however is the final chapter on zoogeography. Zoogeographical areas are dealt with one by one and keys to species level are provided for each. Volumes I and II each contain a common index.

Volume III consists of an exhaustive bibliography divided into (a) the Branchiobdellida with ten pages of references and (b) the Euhirudinea and the Acanthobdellida with 255 pages. It is perhaps unfortunate that separate bibliographies do not follow individual chapters.

This three-volume work is well written and well illustrated and well produced; an undoubted tour-de-force by the author. It will surely stand as the definitive work on the Hirudinea for a long time to come. I learned much from reading selected chapters and unreservedly recommend it to those who teach invertebrate biology and, of course, those with research interests in the leeches. I did not come across any typographical errors.

C.C. APPLETON
Department of Zoology and Entomology, University of Natal, Pietermaritzburg